

AMENDMENTS TO THE CLAIMS

Please amend Claims 2, 10, 23, 31, 37, and 44 as indicated below.

1. (Canceled)
2. (Currently Amended) A method for providing data transfers between a processor and a component, the method comprising:

routing requests originating from a component to a processor through a target controller and handling requests originating from the processor to the component by;

buffering a first address with a first address buffer in response to a read request originating from the processor to the component, and associating a first bi-directional data buffer with the first address wherein the first bi-directional data buffer is configured to hold a first data value requested by the processor from the component;

buffering a second address with a second address buffer in response to a write request originating from the processor to the component, and associating a second bi-directional data buffer with the second address wherein the second bi-directional data buffer is configured to hold a second data value written by the processor to the component, the first and second address buffers being in communication with the processor and the component, wherein the processor operates at a different speed than the component;

buffering a-the first data value requested by the processor with a-the first bi-directional data buffer when the data is obtained from the component and buffering a-the second data value written by the processor with a-the second bi-directional data buffer, the first and second bi-directional data buffers being in communication with the processor and the component, wherein the first and second address buffers are separate from the first and second data buffers;

monitoring the first and second address buffers and the first and second data buffers to determine when the first address and data buffers have obtained the first data value requested by the processor and the second address and data

buffers have written the second data value to the component ~~completed a task~~
and are available for a further task;

controlling the first address buffer and the first bi-directional data buffer as
a matched pair such that the first address held in the first address buffer
corresponds to the first data value requested by the processor from the held
component~~in the first bi-directional data buffer~~;

controlling the second address buffer and the second bi-directional data
buffer as a matched pair such that the second address held in the second
address buffer corresponds to the second data value written by the processor to
the component~~held in the second bi-directional data buffer~~;

reading status information from the first address buffer to determine a
priority status of the first data value;

reading status information from the second address buffer to determine
the priority status of the second data value; and

controlling the order of bi-directional data flow through the first and second
bi-directional data buffers such that data flows ~~concurrently~~ between the
processor and the component while the processor is processing other
instructions and, wherein controlling the order of the bi-directional data flow
through the first and second bi-directional data buffers is variable and based on
the priority status of the first and second data values.

3. (Previously Presented) The method of Claim 2, wherein the first and
second bi-directional data buffers are in communication with the processor via a bus.

4. (Previously Presented) The method of Claim 3, wherein the first and
second bi-directional data buffers are in communication with the bus via a bus master
controller and a bus slave controller.

5. (Previously Presented) The method of Claim 2, wherein the first address
buffer further comprises status bits.

6. (Previously Presented) The method of Claim 5, wherein the status bits relate to the type of request being made by the processor.

7. (Previously Presented) The method of Claim 2, wherein said controlling the first address buffer and the first bi-directional data buffer as a matched pair is performed with pointers.

8. (Canceled)

9. (Previously Presented) The method of Claim 2, wherein said act of controlling bi-directional data flow is performed with at least one input data arbiter.

10. (Currently Amended) A method for controlling data transfers between a processor and a component, the method comprising:

routing requests originating from a component for data from to a processor through a target controller and routing requests from the processor for data from the component;

buffering with a plurality of address buffers, the requests from the component to the processor;

buffering with a plurality of address buffers, the requests originating from the processor to the component, wherein the processor operates at a different speed than the component;

associating a plurality of bi-directional data buffers with the address buffers such that at least one bi-directional data buffer is matched with at least one address buffer for each request, and wherein the bi-directional data buffers are configured to hold data to be obtained from either the component or the processor;

storing status information in each of the plurality of address buffers, the status information determining the priority status of data transfers associated with the address requests;

monitoring the plurality of address buffers and the first to determine when address buffers have completed a task and are available for a further task;

bi-directionally buffering with a plurality of bi-directional data buffers data transfers between the processor and the component, wherein said data transfers can be performed out of a previously defined order based on the priority status of each of the data transfers and such that data transfers can be performed ~~concurrently~~ while the processor is processing other instructions; and

controlling said buffering address requests and said bi-directionally buffering through said plurality of bi-directional data buffers such that each of the buffered data transfers relates to an address held in one of the plurality of address buffers.

11. (Previously Presented) The method of Claim 10, additionally comprising indicating which of the plurality of bi-directional data buffers is available to accept new data.

12. (Previously Presented) The method of Claim 11, wherein said act of indicating is performed with reference pointers.

13. (Canceled)

14. (Previously Presented) The method of Claim 10, wherein said act of buffering address requests includes the use of an input arbiter and an output arbiter.

15. (Previously Presented) The method of Claim 10, wherein said act of bi-directionally buffering is performed with an input arbiter and an output arbiter.

16. (Previously Presented) The method of Claim 10, wherein the plurality of address buffers comprises at least three address buffers and wherein the plurality of bi-directional data buffers comprises at least three bi-directional data buffers and wherein each address buffer is matched as a pair with a corresponding data buffer.

17.-22. (Canceled)

23. (Currently Amended) A method for transferring addresses and data through a bi-directional buffer, the method comprising:

routing requests of a first component originating from a second component through a target controller and handling requests originating from the first component by;

storing a first address in a first buffer in communication with the first component and the second component, the first buffer comprising status bits and wherein the first address is associated with a first read request from the first component to the second component;

storing first data associated with the first read request in a second bi-directional buffer matched with said first buffer so that the first address stored in the first buffer is related to the first data stored in the second bi-directional buffer;

storing a second address in a third buffer in communication with the first component and the second component, the third buffer comprising status bits and wherein the second address is associated with a second read request from the second component to the first component;

storing second data associated with the second read request in a fourth bi-directional buffer matched with said third buffer so that the second address stored in the third buffer is related to the second data stored in the fourth bi-directional buffer;

monitoring the first and second address buffers and the first and second data buffers to determine when the first address and data buffers and the second address and data buffers have completed a task and are available for a further task;

reading the status bits of the first buffer to determine a first priority value of the first data;

reading the status bits of the third buffer to determine a second priority value of the second data; and

controlling the order of bi-directional data flow of the first data and the second data through said second and fourth bi-directional buffers in a variable manner based at least in part on said first and second priority values and

controlling the bi-directional data flow such that data flows ~~concurrently~~ with processing by the second component of other instructions.

24. (Previously Presented) The method of Claim 23, wherein the status bits comprise transfer type bits indicative of the status of an address transfer from the first component to the first buffer.

25. (Previously Presented) The method of Claim 23, wherein the status bits comprise transfer type bits indicative of the status of a data transfer from the first component to the second buffer.

26. (Previously Presented) The method of Claim 23, wherein the first component comprises a memory.

27. (Previously Presented) The method of Claim 23, wherein the first component comprises a processor.

28. (Previously Presented) The method of Claim 27, wherein the first buffer is in communication with the processor via a bus.

29. (Previously Presented) The method of Claim 28, wherein the first buffer is in communication with the bus via a bus master controller and a bus slave controller.

30. (Canceled)

31. (Currently Amended) A method for transferring data between a processor and a component utilizing a plurality of address buffers and a plurality of data buffers, the method comprising:

~~when receiving a first request that originates from the processor, receiving a data read or write~~ the first request including an associated first address from the processor;

determining whether at least one of a plurality of address buffers and an associated bi-directional data buffer are available, wherein the associated bi-directional data buffer is configured to buffer the data identified by the first address from the processor;

storing the ~~associated first~~ address in the at least one address buffer;

storing status information indicative of a priority of the data-first request in the at least one address buffer;

buffering data identified by the associated-first address with the bi-directional data buffer, wherein the data is obtained from a component and is provided to the processor; and

ordering, based on the priority of the data-first request, the transmission of the data from the bi-directional data buffer to the processor and such that data flows bi-directionally ~~and concurrently~~ with processing by the processor of other instructions; and

~~when receiving a second request that originates from the component, routing the request through a target controller~~ the second request including a second address;

determining whether at least one of the plurality of address buffers and associated bi-directional data buffers are available, wherein the associated bi-directional data buffer is configured to buffer the data identified by the second address from the component;

storing the second address in the at least one address buffer; and

buffering data identified by the second address with the bi-directional data buffer, wherein the data is obtained from the processor and is provided to the component.

32. (Previously Presented) The method of Claim 31, additionally comprising receiving the address into the at least one address buffer while data is being read from the bi-directional data buffer.

33. (Previously Presented) The method of Claim 31, wherein the at least one address buffer and the bi-directional data buffer are in communication with the processor via a bus.

34. (Previously Presented) The method of Claim 33, wherein the at least one address buffer and the bi-directional data buffer are in communication with the bus via a bus master controller and a bus slave controller.

35. (Previously Presented) The method of Claim 31, wherein the bi-directional data buffer and the at least one address buffer are associated with each other through the use of pointers.

36. (Canceled)

37. (Currently Amended) An apparatus for controlling data transfers between a processor and a component, the apparatus comprising:

means for buffering at least a first address requests associated with a first request from a processor to a component and buffering at least a second address associated with a second request from a component to a processor;

means for bi-directionally buffering data transfers between the processor and the component, that are associated with the first and second addresses;

means for storing status information indicative of a priority status of the buffered data transfer transfers;

means for controlling the means for buffering and the means for bi-directionally buffering so that each of the buffered data transfers relates to an the first and second addresses address held in the means for buffering, wherein the means for controlling further coordinates an order of said data transfers based at least on the priority status of each buffered data transfer and such that data flows bi-directionally and concurrently with processing by the processor of other instructions; and

means for routing requests the data transfers from the processor to the component and routing the data transfers from the component to the processor.

38. (Canceled)

39. (Previously Presented) The apparatus of Claim 37, wherein the means for buffering includes a plurality of address buffers.

40. (Previously Presented) The apparatus of Claim 37, wherein the means for bi-directionally buffering includes a plurality of data buffers.

41. (Previously Presented) The apparatus of Claim 37, wherein the means for buffering includes an input arbiter and an output arbiter.

42. (Previously Presented) The apparatus of Claim 37, wherein the means for bi-directionally buffering includes an input arbiter and an output arbiter.

43. (Previously Presented) The method of Claim 23, additionally comprising providing signals with an arbiter in communication with said status bits to grant access to the first buffer and to the second buffer such that a third address can be written to the first buffer while data is read from the second buffer.

44. (Currently Amended) A buffer allocation system for managing data flow between components of a computer, the system comprising:

an address buffer module configured to handle address requests between a first component and a second component for requests originating from the first component and the second component, the address buffer module comprising:

a plurality of address buffers each in communication with the first and second components, each address buffer comprising status information indicative of a priority status;

an input address arbiter configured to direct the address requests from the first and second components to the plurality of address buffers; and

an output address arbiter configured to send the address requests from the first component to the second component from the plurality of address buffers and to send the address requests from the second component to the first component from the plurality of address buffers; and

a data buffer module configured to control an order of bi-directional flow of data therethrough between the first and second components based on the priority status of the data and such that data flows bi-directionally and

~~concurrently~~ with processing by the first component of other instructions, the data buffer module comprising:

a plurality of bi-directional data buffers each in communication with the first and second components, wherein one or more of the bi-directional data buffers is paired with one or more of the address buffers such that the bi-directional data buffers are configured to buffer the data to be obtained from the addresses buffered in the paired address buffers;

an input data arbiter configured to direct data to the plurality of bi-directional data buffers; and

an output data arbiter configured to direct data output from the plurality of bi-directional data buffers; and

a target controller configured to route requests between the first and second components ~~for requests originating from the second component.~~

45. (Previously Presented) The system of Claim 44, wherein the plurality of address buffers comprises a first address buffer and the plurality of bi-directional data buffers comprises a first bi-directional data buffer, wherein an address held in the first address buffer corresponds only to a data value held in the first bi-directional data buffer.

46. (Previously Presented) The system of Claim 45, wherein the plurality of address buffers comprises a second address buffer and the plurality of bi-directional data buffers comprises a second bi-directional data buffer, wherein a second address held in the second address buffer corresponds only to a second data value held in the second bi-directional data buffer.

47. (Previously Presented) The system of Claim 44, wherein the address buffer module further comprises a plurality of output multiplexers coupled to the output address arbiter and the plurality of address buffers.

48. (Previously Presented) The system of Claim 44, wherein the data buffer module further comprises a plurality of output multiplexers coupled to the input data arbiter and the plurality of bi-directional data buffers.

49. (Previously Presented) The apparatus of Claim 37, wherein the means for routing requests from the component to the processor comprises a PCI target controller.

50. (Previously Presented) The method of Claim 2, wherein the data flowing concurrently comprises one or more of:

- the processor writing data to the first data buffer at the same time that data is being read from a PCI bus into the second data buffer;

- a deferred data read from the first data buffer occurring concurrently with a data read from a PCI bus to the second data buffer; and

- performing a deferred data read from the first data buffer to the processor at the same time as performing a data write operation from the second data buffer to a PCI bus.

51. (Previously Presented) The method of Claim 10, wherein the concurrent data transfer comprises one or more of:

- the processor writing data to a first data buffer at the same time that data is being read from a PCI bus into a second data buffer;

- a deferred data read from a first data buffer occurring concurrently with a data read from a PCI bus to a second data buffer; and

- performing a deferred data read from a first data buffer to the processor at the same time as performing a data write operation from a second data buffer to a PCI bus.

52. (Previously Presented) The method of Claim 23, wherein the data flowing concurrently comprises one or more of:

- the first component writing data to the second buffer at the same time that data is being read from a PCI bus into the fourth buffer;

- a deferred data read from the second buffer occurring concurrently with a data read from a PCI bus to the fourth buffer; and

performing a deferred data read from the second buffer to the first component at the same time as performing a data write operation from the fourth buffer to a PCI bus.

53. (Previously Presented) The method of Claim 31, wherein the data flowing concurrently comprises one or more of:

the processor writing data to a first data buffer at the same time that data is being read from a PCI bus into a second data buffer;

a deferred data read from a first data buffer occurring concurrently with a data read from a PCI bus to a second data buffer; and

performing a deferred data read from a first data buffer to the processor at the same time as performing a data write operation from a second data buffer to a PCI bus.

54. (Previously Presented) The system of Claim 44, wherein the data flowing concurrently comprises one or more of:

the first component writing data to a first data buffer at the same time that data is being read from a PCI bus into a second data buffer;

a deferred data read from a first data buffer occurring concurrently with a data read from a PCI bus to a second data buffer; and

performing a deferred data read from a first data buffer to the first component at the same time as performing a data write operation from a second data buffer to a PCI bus.